

Chapter 26 Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act require the assessment of cumulative impacts in the decision-making process for proposed federal projects. Cumulative impacts are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). As stated in the CEQ handbook, "Considering Cumulative Effects under the National Environmental Policy Act" (CEQ 1997), cumulative impacts should be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful.

Words in **bold** and acronyms are defined in Chapter 32, Glossary and Acronyms.

This chapter provides an analysis of potential cumulative impacts related to the Proposed Action, that is, the I-5 project. The analysis was accomplished using the following four steps:

Step 1 - Identify Potentially Affected Resources

Resources were identified that potentially could be cumulatively affected by the I-5 project when combined with other actions (see Section 26.1, Affected Resources and Resource Boundaries).

Step 2 - Establish Boundaries

Spatial (i.e., location) and temporal (i.e., time) boundaries were established for the consideration of other potentially cumulative actions (see Section 26.1, Affected Resources and Resource Boundaries).

Step 3 - Identify Potentially Cumulative Actions

Other past, present, and reasonably foreseeable future actions were identified that have contributed, or could contribute, to cumulative impacts on the resources identified in Step 1 (see Section 26.2, Cumulative Actions). These actions fall within the spatial and temporal boundaries established in Step 2.

Step 4 - Analyze Cumulative Impacts

For each resource, the actions identified in Step 3 were analyzed in combination with the impacts of the I-5 project. This analysis describes the overall cumulative impact related to each resource and the I-5 project's contribution to this cumulative impact (see Section 26.3, Cumulative Impacts Analysis).

26.1 Affected Resources and Resource Boundaries

To identify resources that could be cumulatively affected by the I-5 project and other actions (Step 1), BPA considered a large geographic area within the general vicinity of the project area and the likelihood that various other actions, with a wide range of potential effects on many

resources, have taken or could take place within this area. Accordingly, BPA determined that all of the same resources described in the affected resource chapters in this EIS (see Chapters 5 through 22) should be considered in the cumulative analysis.

BPA then established reasonable boundaries for the consideration of other past, present, and reasonably foreseeable future actions (Step 2). These boundaries are in terms of where the other actions are located (i.e., spatial boundaries), and when in time these actions took place or will take place (i.e., temporal boundaries). Accordingly, for each resource, the spatial boundary is the area where other past, present, and reasonably future actions have, are, or could take place and create cumulative impacts on the affected resource when combined with the impacts of the I-5 project. Appropriate spatial boundaries can vary for each resource; the boundaries identified for this analysis are described by resource (see Section 26.3, Cumulative Impacts Analysis).

The temporal boundary describes how far into the past, and forward into the future, other actions should be considered in the cumulative impact analysis. For the purposes of this analysis, past and present actions that have shaped the landscape since about the first European settlement in the general vicinity (i.e., since about the early to mid 1800s) are considered, to the extent that they have had lasting effects contributing to cumulative impacts. The reasonably foreseeable nature of potential future actions helps define the forward-look temporal boundary. While BPA acknowledges that the proposed project could exist for 50 or more years and could contribute to cumulative impacts during that timeframe, it would be speculative to consider actions beyond what is reasonably foreseeable (see Section 26.2.2, Reasonably Foreseeable Future Actions). Given this limitation, the forward-looking temporal boundary has been established generally at about 10 years following the expected completion of construction of the proposed project, which is a reasonable timeframe by which the reasonably foreseeable future actions identified in Section 26.2.2 likely would be implemented.

26.2 Cumulative Actions

After establishing appropriate spatial and temporal boundaries, BPA identified other past, present, and reasonably foreseeable future actions potentially contributing to cumulative effects along with the I-5 project (Step 3). To identify these other actions, BPA used information gathered in the course of developing the analysis of direct impacts related to the I-5 project, and consulted various federal, tribal, state, and local jurisdictions. The following discussion provides more information on how potentially cumulative past, present, and reasonably foreseeable future actions were identified, and describes the cumulative actions that have been identified for the cumulative analysis in this EIS.

26.2.1 Past and Present Actions

Past actions relevant to the cumulative analysis in this EIS are those that have previously taken place and are largely complete, but that have lasting effects on one or more resources that also would be affected by the I-5 project. For these past actions, CEQ has issued a guidance memo entitled "Guidance on Consideration of Past Actions in Cumulative Effects Analysis." This guidance states that consideration of past actions is only necessary in so far as it informs agency decision-making. Typically the only types of past actions considered are those that continue to have present effects on the affected resources. In addition, the guidance states that "[a]gencies are not required to list or analyze the effects of individual past actions unless such information is

necessary to describe the cumulative effect of all past actions." Accordingly, agencies are allowed to aggregate the effects of past actions without "delving into the historical details of individual past actions." In this EIS, impacts from past actions are largely captured in the sections of each resource chapter that discuss the affected environment (see Chapters 5 through 22).

Present actions are those that are currently occurring and also result in impacts to the same resources as would be affected by the I-5 project. Present actions generally include on-going land management and use activities (such as farming), and recently completed residential, commercial, and industrial development. Similar to past actions, relevant present actions have largely been captured in Chapters 5 through 22 of this EIS.

The following summarizes some of the more significant past and present actions in the general vicinity of the proposed project that have created cumulative impacts relevant to this analysis:

Agricultural use—Beginning with European settlement in the early to mid 1800s, thousands of acres of land were converted from native prairie and floodplain to agriculture and pasture. These uses tend to be located in the flatter, lower elevation areas near the cities of Camas, Vancouver, and the Columbia River crossing. The conversion of undeveloped land to cropland largely stopped in the mid 1900s as most available and agriculturally suitable lands had already been converted. In recent years, as suburban development has expanded, agricultural land has been subdivided for residential development, reducing the amount of agricultural use.

Timber clearing—European settlers also cleared native forest from thousands of acres for agricultural and other uses. Much of the tree clearing for agriculture took place on the flatter, lower elevation areas suitable for agriculture. In addition, as communities throughout the Lower Columbia River region were being developed in the late 1800s and early 1900s, nearby foothills and other wooded areas often were partially or fully cleared so trees could be used for houses, barns, fences, and other structures in and near these communities. Some cleared areas were allowed over time to revegetate and have become forested once again, while other areas were subsequently developed for other uses and remain occupied by these uses.

Timber harvest—Over the years, large areas of native forest have been converted into timber stands managed for timber harvests. Timber harvest in the Lower Columbia River region began in the 1860s (NMFS and USFWS 2006); however, at that time, the general practice was to clear cut an area rather than actively manage it for ongoing production, as is more the standard practice today. Today, most lands managed for timber harvest in the general vicinity are in Cowlitz County. Additional timber lands are in the eastern part of Clark County. The large tracts of forest under timber harvest management in these counties exist in various age classes across the landscape as harvests are rotated. Most recent timber harvests have been on private timber company lands and state lands managed by WDNR. Federal lands, such as on the Gifford Pinchot National Forest, have supported timber harvest as well. Cowlitz and Clark counties support thousands of acres of timber harvest per year.

Development of the Portland/Vancouver metro area—European settlement of the Portland-Vancouver metro area began in the early 1820s with the establishment of Fort Vancouver. Fort Vancouver served as the center of fur trading for the Pacific Northwest for many years. The U.S. military established the Columbia Barracks in 1849. Later called Vancouver Barracks, they served as a military epicenter for the Pacific Northwest until it was abandoned in the mid-nineteenth century. The City of Vancouver incorporated in 1857 and

steadily grew. Vancouver industry was critical to the success of World Wars I and II. During World War I, lumber milled in Vancouver was used to build planes and during World War II, the Kaiser Shipyard produced many ships integral to the war effort. Aluminum smelters across the region, including the Reynolds plant (originally built in 1941 by the federal government and now removed) in the Portland area, produced aluminum also used in the war effort.

The development of Portland began in 1843 as roads were built, forest cleared, and buildings constructed. Portland incorporated in 1851 and development increased rapidly after the Civil War as the shipping industry grew. Portland's shipping industry focused on exporting lumber, fish, and agricultural products to other West Coast cities and the world. By the late 1890s, Portland was the largest city in the Pacific Northwest and currently, is second only to Seattle, Washington for population. Today, the Portland/Vancouver metro area is the 23rd largest metropolitan area in the U.S. and the largest in the general project vicinity. Portland has a mix of commercial, industrial, and residential uses, in addition to large open spaces and public uses. The Portland/Vancouver metro area covers over 191 square miles and will likely expand as adjacent communities develop.

Development of the Longview/Kelso metro area—The Longview/Kelso metro area is the second largest populated area in the general project vicinity. European settlement of the Longview/Kelso area began in the late 1840s with establishments of the town of Kelso to the east of the Cowlitz River and the Monticello settlement to the west of the Cowlitz River. While development of Kelso steadily occurred over the years (including incorporation of the City of Kelso in the 1890s), the area around the Monticello settlement consisted largely of sparsely populated wilderness and rural homesteads until the Long-Bell Lumber Company decided in the 1910s to build two lumber mills in the area. Realizing the need for workers for these mills, the Company acquired lands and began development of a planned city to support the mills. Soon afterwards in 1924, the City of Longview was incorporated. Today, the Longview/Kelso area has a highly developed mix of commercial, industrial, and residential uses, and various public uses and open space areas. Combined, the two cities cover about 35 square miles, but various rural residential, commercial, and other uses have been developed in surrounding areas as well.

Development of other towns and communities—There are also several smaller towns and communities located in Clark, Cowlitz and Multnomah counties. Clark County has a population of about 350,000 and has several cities and towns, including Battleground, Camas, La Center, Ridgefield, Washougal and Yacolt as well as Vancouver (described above). Clark County's development transitioned from mainly agriculture, lumber and fishing to shipbuilding and aluminum during the World Wars. Today, Clark County's development is a mix of commercial and industrial uses.

Cowlitz County is less populated than Clark County with a population of about 94,000 and has several cities including Castle Rock, Kalama and Woodland, and Longview and Kelso (described above). Cowlitz County's early development focused on timber production and was strongly influenced by the many waterways within and around the county, such as the Columbia, Lewis, Kalama, Coweeman, Toutle and Cowlitz rivers. Today, Cowlitz County still provides lumber for domestic and international use. Tourism in Cowlitz County also expanded with the eruption of Mount St. Helens in 1980.

Multnomah County is Oregon's most populous county and includes the cities of Fairview, Gresham, Maywood Park, Troutdale, Wood Village and Portland (described above). Similar to Clark County, Multnomah County's early development focused on lumber and fishing. Today,

development focuses on manufacturing, transportation, and tourism. Shipping is also a major industry and the Port of Portland exports more wheat than any other U.S. port.

Rural residential development—Rural residential development is scattered throughout many portions of the general vicinity. Clark County has several census-designated places. Census-designated places are “closely settled, named, unincorporated communities that generally contain a mixture of residential, commercial, and retail areas similar to those found in incorporated places of similar sizes” (U.S. Census 2012). Census-designated places include Amboy, Brush Prairie, Felida, Hazel Dell, Hockinson Mill Plain, Minnehaha Orchards, and Salmon Creek. These areas tend to have similar characteristics to cities and towns (commercial and residential areas), but lack a municipal government. Other rural areas in Clark County include Chelatchie, Heisson and Sifton.

Cowlitz County also has a few census designated places: Longview Heights, West Longview and West Side Highway. It also has several unincorporated areas, such as Ariel, Carrolls, Lexington, Silver Lake, Toutle and Yale. These areas are marked by a mix of residential and some commercial development.

Multnomah County does not have any census-designated places, but has several unincorporated communities including Bonneville, Corbett, Dunthorpe, Riverwood, Springdale and Warrendale. The development in these communities is mainly residential with some light commercial uses.

Highway and rail development—Many interstate and state highways run through the general vicinity including the following: I-5, a major transportation route that extends from the U.S.-Mexico border to the U.S.-Canada border; I-205 in Multnomah and Clark counties; SR 14, 500, 501, 502 and 503, (in Clark County); SR 503, SR 4, 411, 432, and 504 (in Cowlitz County); and I-84 (Multnomah County). In Multnomah County, state highways 26 and 30 run south of the project area. These highways bisect native prairie, forest, riparian areas, and agricultural lands, and in many cases, have facilitated greater urban and industrial development.

Clark and Multnomah counties’ railway development expanded with the completion of a railroad bridge connecting Portland and Vancouver in 1908. That same year, the Spokane, Portland and Seattle Railway (SPS) was completed, which brought increased population and development to the Portland/Vancouver metro area. The SPS Railway later became part of the Burlington Northern Santa Fe (BNSF) Railway, which still operates today. Like BNSF, Union Pacific also operates and serves several of the ports including the Port of Portland and Port of Kalama (discussed below). Amtrak also operates the *Coast Starlight*, which stops in Portland, Vancouver, and Kelso-Longview. In addition to these railroads, the Chelatchie Prairie Railroad is the only short line operating in Clark County. Similar to Clark and Multnomah counties, railroad development shaped the settlement of Cowlitz County. The Northern Pacific Railroad created Kalama when it chose its present location as the starting point for its line to Tacoma, Washington. Timber companies, such as Weyerhaeuser, also historically operated railroads in Cowlitz County to transport their products to domestic and world markets. Similar to highways, railroads bisect native prairie, forest, riparian areas, and agricultural lands.

Ports and Airports—Urban and commodity development in the lower Columbia River region, as well as throughout the Columbia River basin, has also led to the development of many shipping ports and airports in this area. Shipping ports have been developed along the Columbia River primarily to handle the export of goods such as timber or grains grown or produced in the

region, as well as the import of goods from other countries to destinations in the project vicinity, the Pacific Northwest, and throughout the U.S. (see Table 26-1). These ports typically

Table 26-1 Existing Port Facilities in the Project Vicinity (River Mile)

Name of Port	Location	Primary Uses	Key Features
Longview	Columbia River Mile 66	Marine Terminals, Industrial Park, Boat Launches	Eight deep draft vessel marine terminal berths; 3,752 feet of docks; ship loader and conveyor systems; harbor cranes; 743-acre industrial park; 500,000 square feet of warehouse space; 3 Port-funded boat launches
Kalama	Columbia River Mile 75	Marine Terminals, Industrial Park, Marina	Six deep draft vessel marine terminal berths; 3,537 feet of docks, 75-acre industrial park; 222 marina moorage slips
Woodland	Columbia River Mile 85	Industrial Parks	110 acres of industrial park
Ridgefield	Columbia River Mile 92	Boat launches, Industrial Park, Research Park	Two boat/kayak launches; 75-acre industrial park; 30-acre research park
Vancouver	Columbia River Mile 104	Marine Terminals, Industrial Park	Thirteen deep draft vessel marine terminal berths; 370+ acres of marine terminals; ship loader and conveyor systems; harbor cranes; 724,000 square feet of dockside warehousing; 250 acres of dockside open storage; 800 acres of industrial park
Portland	Columbia River Mile 104; Willamette River Mile 0.0 to 6.5	Marine Terminals, Industrial Parks	Four marine terminals; 1,035 acres of marine terminals; ship loader and conveyor systems; harbor cranes; 4,380 acres of industrial parks
Camas-Washougal	Columbia River Mile 121.7	Marina, Industrial Park	350+ marina moorage slips; marina fueling and guest docks; 430-acre industrial park

are located next to railroad lines and highways to facilitate the transport of goods, and often include other facilities such as industrial parks and marinas. Airports also have been developed to help ship goods and transport people. These airports have been developed with typical airport infrastructure, such as terminals, runways, hangars, parking structures/lots, and roadways. Portland International Airport, which occupies about 3,000 acres near the I-205 crossing of the Columbia River, is the largest airport in the area. This airport opened in 1940 and serves both civil and military aircraft. There are also several general aviation airfields (e.g., Pearson Field and Grove Field) along with a number of private airfields (e.g., Green Mountain Airport and Goheen Airport near Battleground) that have been developed. These airfields range from a few acres to several hundred acres.

Transmission lines—BPA and other utilities have built numerous transmission and distribution lines, substations, and other ancillary facilities (see Section 2.2.1, Transmission Line Route Segments).

Power generation development—Power generation facilities include hydroelectric dams, and natural gas, coal, and biomass plants. The hydroelectric generation facilities located along the Lewis River, which follows the Clark and Cowlitz county line, were developed in the 1930s and 1950s. These facilities created three main water impoundments—Lake Merwin, Yale Lake, and Swift Reservoir, which inundated lands, forested areas, and habitats along the Lewis River. Most natural gas-fired facilities in the region have been developed in the last two decades as gas supply pipelines have been extended through the area, although some were developed in the 1970s. Examples include PGE’s 516-MW Beaver and 410-MW Port Westward facilities near Clatskanie, Oregon; Clark Public Utilities’ 248-MW River Road facility near Vancouver; and Puget Sound Energy’s 319-MW Mint Farm facility in Longview. These gas facilities have generally converted open areas into industrial uses with air and water emissions. The primary coal and biomass generation facilities are those owned by Weyerhaeuser and Longview Fiber at their paper pulp mill facilities near Longview. Georgia-Pacific also operates a biomass generation facility near Camas. Development of generation facilities at these locations typically involved expansions of existing developed industrial uses that created incremental increases in air and water emissions.

26.2.2 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions are those actions that are likely to occur and affect the same resources as the I-5 project. For a future action to be considered reasonably foreseeable, there must be a level of certainty that it will occur. This level of certainty is typically met by the submission of a formal project proposal or application to the appropriate jurisdiction, approval of such a proposal or application, inclusion of the future action in a formal planning document, or other similar evidence. For future actions in the proposal stage, the future action also must be sufficiently defined in terms of location, size, design, and other relevant features to permit meaningful consideration in the cumulative analysis.

BPA contacted various entities, including government agencies, ports and public utilities, throughout the general vicinity to identify reasonably foreseeable future actions. Several entities provided project proposal lists or directed BPA to their planning documents, such as capital facility or transportation plans, which list reasonably foreseeable future actions. BPA staff also searched Ecology’s State Environmental Policy Act (SEPA) Register, which provided a current list of all projects requiring NEPA and/or SEPA review.

Table 26-2 lists information about the reasonably foreseeable projects considered in the cumulative impact analysis, based on currently available information. The table provides a brief description of each of these projects, identifies the entity (or entities) that proposed the project and/or is primarily responsible for reviewing and approving the project, provides general location information for each project, and notes the current status (i.e., proposed, approved, or under construction) of each project. The projects in Table 26-2 are generally sorted by the primary involved entity in the following order: federal government, Tribes, state agencies, county and local agencies, ports, and utilities. The general location of each project is also shown on Map 26-1, which is keyed to the Map IDs identified in Table 26-2.

While Table 26-2 identifies specific reasonably foreseeable future actions that are known at this time, BPA acknowledges that other future actions and development likely will be proposed over time. Given the level of development and land management practices already in place, new development will continue as population growth and demand for resources increase. The regional road and highway system likely will expand as commercial and residential development encroaches into what are now rural areas. Further development of utility infrastructure such as natural gas pipelines, electrical distribution lines, telecommunications, and cell towers likely will be ongoing. Marine terminals, ports, and commercial/industrial districts will be further developed to meet market demands for products and services.

Table 26-2 Reasonably Foreseeable Future Actions

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
<i>Federal</i>				
Columbia River Crossing Project: Bridge, transit and highway improvement	US Federal Highway Administration/ Washington State Department of Transportation (WSDOT) and Oregon Department of Transportation (ODOT)	Vancouver, WA and Portland, OR	119	Approved
Sandy River Delta Section 536 Ecosystem Restoration Project: Remove a dam and restore fish access to the main channel of the Sandy River	U.S. Army Corps of Engineers, U.S. Forest Service, and Portland Water Bureau	Multnomah County, OR	174	Proposed
<i>Tribal</i>				
Cowlitz Casino Resort: Construct casino on 152 acres at La Center's I-5 interchange in Clark County, Washington	Cowlitz Tribe	La Center, WA	91	Approved
<i>Washington State</i>				
Columbia River Dredging: Dredging of up to 3.1 million cubic yards of material from the Columbia River over a period of 10 years	Department of Ecology/Weyerhaeuser NR Company	Near Longview, WA	62	Approved
Soil Remediation: Excavate 3,652 cubic yards of soil contaminated with wood preservative products from three locations within Port of Ridgefield property	Department of Ecology/Port of Ridgefield	Ridgefield, WA	94	Approved
Timber Harvests: Several WDNR and other timber owner harvests throughout eastern Cowlitz County	Department of Natural Resources/Individuals	Various locations throughout Cowlitz County, WA	74	Approved

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
Timber Harvests: Several WDNR and other timber owner harvests throughout eastern Clark County	Department of Natural Resources/Individuals	Various locations throughout Clark County, WA	105	Approved
Surface Mining Reclamation: Continued mining of rock from quarry; use will increase from 3.5 acres to 27.5 acres	Department of Natural Resources	SE of Battle Ground, WA	107	Approved
I-5 - SR 432 Talley Way Interchange: Improve the I-5 interchange at SR 432 and the adjacent SR 432 interchange at Talley Way	WSDOT/Cowlitz-Wahkiakum Council of Governments, cities of Kelso and Longview, Port of Longview, and Cowlitz County	Kelso, WA	17	Under Construction
I-5/Dike Access Road and Burlington Northern Railroad Bridge: Replace expansion joints at both ends of Burlington Northern Railroad Bridge	WSDOT	Woodland, WA	84	Approved
I-5/E Fork Lewis River Bridge to Todd Road Vicinity: Paving Improvements to I-5 at the East Fork of the Lewis River Bridge near Todd Road	WSDOT	Woodland, WA	85	Approved
I-5 - Reconstruct Interchange at NE 134th (Salmon Creek Interchange Project): Construct a new I-5 interchange at NE 139th Street, improve the I-205 northbound off-ramp to NE 134th Street, and construct other local road improvements	WSDOT/Clark County Public Works Department	Salmon Creek area of Vancouver, WA	114	Under Construction
SR 14 - Camas-Washougal Widening and Interchange: Improve State Route 14 between the NW Sixth Avenue interchange in Camas, WA and Sixth Street in Washougal, WA	WSDOT/Port of Camas-Washougal, the cities of Camas and Washougal, and Clark County Department of Public Works	Camas, WA and Washougal, WA	164	Under Construction
SR 500 - St. Johns Boulevard Interchange: Construct freeway style interchange at intersection of State Route 500 and St. Johns Boulevard	WSDOT	Vancouver, WA	120	Under Construction

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
I-5 - SR 501 Ridgefield Interchange: Replace the existing I-5 interchange at SR 501 with new bridge, widen SR 501 and improve SR 501/56th Place and Pioneer Street/65th Avenue intersections	WSDOT/City of Ridgefield and Port of Ridgefield	Ridgefield, WA	95	Under Construction
SR 502 - Widening From I-5 to Battle Ground: Widen SR 502 from I-5 east into the City of Battle Ground	WSDOT	near Battleground, WA	108	Under Construction
SR 503 - 4th Plain/SR 500 Intersection: Improve the SR 503/SR 500 intersection at Fourth Plain Road	WSDOT	Vancouver, WA	121	Under Construction
I-205 - Mill Plain Interchange to NE 18th Street: Construct new I-205 northbound off-ramp and southbound on-ramp at NE 18th Street	WSDOT/City of Vancouver	Vancouver, WA	122	Under Construction
Cowlitz County				
Residential Development: Lexington Heights parcel D planned lot development (40 residential lots)	Cowlitz County Planning Division/Private Lenders Group and Individual	Longview, WA	63	Approved
Residential Development: at Lexington Heights divide 5 lots on 28 acres into 23 single family residential lots and two lots into 150 multifamily apartments	Cowlitz County Planning Division/Individual	Longview, WA	64	Approved
Commercial Development: construct 100,000 sq-ft mini-storage facility on 5.21 acres; 750 sq-ft of office space; 51 parking spaces, utilities, stormwater facility, signage, lighting, fencing	Cowlitz County Planning Division/Woodford CRE and Individual	Kelso, WA	18	Approved
Subdivision Development: develop 27 lots on 6.27 acres	Cowlitz County Planning Division/Crown Royal Subdivision, Olsen Engineering Inc, and Riverview Community Bank	Longview, WA	65	Proposed

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
Single Family Home Development: construct single family home and outbuildings on 3.16 acres	Cowlitz County Planning Division/Individual	Longview, WA	66	Approved
Utility Transmission Construction: install a 1.178 mile long, secondary 115 KV power transmission line at the existing Longview Fiber Plant Site; install 15 transmission wooden power poles and replace 14 poles	Cowlitz County Planning Division/SWP Environmental Services	Longview, WA	67	Approved
Park Restoration: Harry Gardner Park Restoration on 14.9 acres	Cowlitz County Planning Division/Cowlitz County	Castle Rock, WA	4	Proposed
Recreational Development: construct a zip line and trails over 23 acres	Cowlitz County Planning Division/Kiddigan Investment, LLC	Goat Island (Silver Lake), WA	2	Approved
Short Subdivisions, Urban Subdivisions, and Rural Subdivisions: various applications for subdivisions throughout Cowlitz County, WA	Cowlitz County Planning Division	Cowlitz County, WA	75	Proposed
Private Roads: various applications for private roads throughout Cowlitz County, WA	Cowlitz County Planning Division	Cowlitz County, WA	76	Proposed
Private Bridge Replacement	Cowlitz County Planning Division/Longview Timberlands, LLC	Kelso, WA	19	Approved
Road Improvement: improve one mile of South Silver Lake Road and remove unoccupied house	Cowlitz County Public Works	Between Silverlake, WA and Castle Rock, W	3	Approved
Detention Structure Improvement: improve Lexington Detention Structure by raising the earthen dam	Cowlitz County Public Works	Near Lexington area of Cowlitz Co, WA	16	Proposed

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Recreational Development: expand and renovate existing BMX track on 2 acres	City of Castle Rock Public Works Department	Castle Rock, WA	5	Approved
Cowlitz Street West Reconstruction Phase I: improve parking and stormwater system; design street and install underground utilities and reconstruct road and construct sidewalks	City of Castle Rock	Castle Rock, WA	6	Proposed
River Front Trail NE Extension and Improvement: extend River Front Trail from Shintaffer Street to Huntington Railroad Bridge; improve trail near Shintaffer Street and provide improved access to the Cowlitz River	City of Castle Rock	Castle Rock, WA	7	Proposed
Front Street North Reconstruction: multi-phase project widening Front Street North between Huntington and Shintaffer St NW	City of Castle Rock	Castle Rock, WA	8	Proposed
Dougherty Drive Reconstruction: widen Dougherty Drive to 3 lanes, resurface, and add curb, gutter, sidewalk and street lighting	City of Castle Rock	Castle Rock, WA	9	Proposed
Roake Avenue SE Sidewalk Installation: install new sidewalk along Roake Avenue from Elementary School to "B" Street SE	City of Castle Rock	Castle Rock, WA	10	Proposed
"C" Street Sidewalk Installation: install new sidewalk along "C" Street from Huntington Avenue to Kirby Avenue SE	City of Castle Rock	Castle Rock, WA	11	Proposed
Easement Sidewalk Installation: install new sidewalk along Easement from Roake Avenue to Allen Avenue SE	City of Castle Rock	Castle Rock, WA	12	Proposed
Cowlitz River Pedestrian Bridge at SR 411: construct new pedestrian bridge over the Cowlitz River at SR 411	City of Castle Rock	Castle Rock, WA	13	Proposed

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Overlay Huntington Avenue S: overlay Huntington Avenue S from Front Avenue S to I-5	City of Castle Rock	Castle Rock, WA	14	Proposed
Stormwater Treatment Project: route stormwater to treatment system; install gravity pipe, pump station, pressurized pipe, ditches, and treatment wet pond	City of Kalama/RSG Forest Products	Kalama, WA	78	Approved
Subdivision Construction: subdivide 8.29 acres into 30 residential lots; construct a new road, sewer, water main and storm sewer	City of Kalama/Individuals	Kalama, WA	79	Approved
Commercial Development: develop three commercial buildings on 1.89 acres	City of Kelso Community Development Department/Kelso Highlander Group, LLC	Kelso, WA	23	Approved
Reservoir Construction: construct 2 million gallon concrete reservoir on 1 acre next to an existing reservoir	City of Kelso Community Development Department	Kelso, WA	24	Approved
Cowlitz River Bike/Pedestrian Path: construct Cowlitz River Bike/Pedestrian Path from Yew Street to Coweeman River	City of Kelso	Kelso, WA	25	Under Construction
Yew Street Reconstruction: rehabilitate sidewalk, storm system and roadway on Yew Street between S Pacific Avenue and 7th Avenue	City of Kelso	Kelso, WA	26	Under Construction
West Main Street Realignment: realign West Main Street from SR 4 to SR 411	City of Kelso	Kelso, WA	27	Under Construction
BNSF Railroad Pedestrian Crossing: provide grade separated crossing of Burlington Northern Santa Fe Railroad for pedestrians on Allen Street	City of Kelso	Kelso, WA	28	Under Construction

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
14th Avenue and Broadway Intersection Improvement: improve pedestrian facilities, street and signal at 14th Avenue and Broadway intersection	City of Kelso	Kelso, WA	29	Under Construction
Sidewalk Installation: install sidewalks on Redpath Street	City of Kelso	Kelso, WA	30	Proposed
Bridge Repair: repair Kelso Drive Bridge	City of Kelso	Kelso, WA	31	Proposed
Riverfront Park Pedestrian Access: construct pedestrian crossing of railroad tracks from 1st Avenue to Cowlitz River Pedestrian Path	City of Kelso	Kelso, WA	32	Proposed
Ross Avenue Widening: Widen Ross Avenue, construct curb & gutter, sidewalk and drainage from Redpath Street to Division Street (Phase I) and Division Street to Barnes Street (Phase 2)	City of Kelso	Kelso, WA	33	Proposed
Bridge Replacement or Repair: repair or replace Talley Way Bridge	City of Kelso	Kelso, WA	34	Proposed
Allen Street Sidewalk Installation: install sidewalks on Allen Street from Swanson Road to Crescent Avenue	City of Kelso	Kelso, WA	35	Proposed
Harris Street Guardrail Installation: install guardrail along south side of Harris Street	City of Kelso	Kelso, WA	36	Proposed
Intersection Reconfiguration: reconfigure intersection of Grade Street/5th Avenue/Oak Street	City of Kelso	Kelso, WA	37	Proposed
Kelso Drive Resurfacing: resurface Kelso Drive from "S" Curves to SR 432	City of Kelso	Kelso, WA	38	Under Construction

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
N Kelso Avenue Crosswalk Improvement: install flashing crosswalk N Kelso Avenue crosswalk	City of Kelso	Kelso, WA	39	Under Construction
Corduoy Road Reconstruction: reconstruct Corduroy Road from Allen Street to Harris Street including new sidewalks, curb and gutter and drainage system	City of Kelso	Kelso, WA	40	Proposed
North Pacific Avenue Reconstruction: widen N Pacific Avenue from Redpath Street to Barnes Street and construct curb and gutter, sidewalks and storm drainage	City of Kelso	Kelso, WA	41	Proposed
Seventh Avenue and Walnut Street Improvements: widen roads, install curb and gutter, sidewalks and drainage system and overlay existing pavement	City of Kelso	Kelso, WA	42	Proposed
Kelso Drive/Carrolls Road Intersection Improvements: realign intersection and install left turn lane	City of Kelso	Kelso, WA	43	Proposed
South Pacific Avenue Widening: widen South Pacific Avenue from Yew Street to Willow Street (Phase 1) and Willow Street to Hazel Street (Phase 2) and construct curb and gutter, sidewalk and drainage	City of Kelso	Kelso, WA	44	Proposed
Coweeman River Bike/Pedestrian Path: install bike/pedestrian path along top of Coweeman Dike from Allen Street to Grade Street	City of Kelso	Kelso, WA	45	Proposed
Old Highway 99 Resurfacing: resurface Old Highway 99 from SR 432 to Kelso, WA City Limits	City of Kelso	Kelso, WA	46	Proposed
Long Avenue Improvements: add second northbound lane to Long Avenue	City of Kelso	Kelso, WA	47	Proposed

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Sunrise Street Resurfacing: resurface Sunrise Street from Jones Road to Burcham Street and construct sidewalks and handicap ramp	City of Kelso	Kelso, WA	48	Proposed
Talley Way Improvements: widen Talley Way from Coweeman River to Colorado Street and construct curb and gutter, drainage system and sidewalk	City of Kelso	Kelso, WA	49	Proposed
Carroll Road Improvements: widen Carroll Road from Kelso Drive to Kelso, WA City Limits and install drainage, replace guardrails and sidewalks, and overlay roadway	City of Kelso	Kelso, WA	50	Proposed
Mill Street Widening: widen Mill Street between South Pacific Avenue and 13th Avenue, replace existing sidewalks as needed and install new handicap ramps	City of Kelso	Kelso, WA	51	Proposed
13th Avenue Reconstruction: reconstruct 13th Avenue from Colorado Street to Grade Street and install curb/gutter, sidewalks, illumination, and 13th/Grade Traffic Signal	City of Kelso	Kelso, WA	52	Proposed
Building Replacement: demolish apartment complex and garages; construct a new building and parking structure	City of Longview Community Development Department/Lower Columbia College	Longview, WA	53	Approved
Groundwater Supply and Treatment Facility: construct site improvements for the construction of the new groundwater supply and treatment plant in Mint Farm Industrial Park and associated transmission main	City of Longview Public Works Department	Longview, WA	54	Approved
Levee Modification: fill in two driveway cuts in the Cowlitz River Levee	City of Longview Community Development Department/Consolidated Diking District #1	Longview, WA	55	Approved

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Civic Center Circle: safety improvements from 16th Avenue and Louisiana to 17th Avenue and Larch Street	City of Longview	Longview, WA	56	Under Construction
Signal and Pedestrian Facilities Modification in the 15th Avenue Corridor: modify signal at 15th/Olympia Water/Hudson Street and improve pedestrian facilities between Douglas and Hemlock Streets	City of Longview	Longview, WA	57	Under Construction
Crosswalk Improvements: improve crosswalks at 28th Avenue and Washington Way	City of Longview	Longview, WA	58	Under Construction
Crosswalk Installation at 30th Avenue: install crosswalk at 30th Avenue from Pine to Pennsylvania Avenue	City of Longview	Longview, WA	59	Under Construction
Columbia Heights Road Improvements: improve Columbia Heights Road between Upper Maplewood and Fishers Lane and improve Columbia Heights and Fishers Lane intersection	City of Longview	Longview, WA	60	Under Construction
Commercial Development: construct Les Schwab Tire Center on 1.7 acres	City of Woodland/Brothers Chumbley LLC	Woodland, WA	86	Approved
Scott Avenue Crossing Project: construct an east/west arterial connecting the Port of Woodland and industrial areas to the City of Woodland and I-5 over multiple phases	City of Woodland	Woodland, WA	87	Proposed
Clark County				
Recreational Development: develop 500 acres for bungee jumping from Canopy Creek Bridge and zip line tours	Clark County Department of Community Development/Bungee.Com	Clark County near Chelatchie, WA	89	Approved

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
Wetland Rehabilitation/Restoration: establish a wetland mitigation bank on 110 acres	Clark County Department of Community Development/EFL Mitigation Partners, LLC	La Center, WA	92	Approved
Subdivision Development: develop 0.81 acre for ten single family lots	Clark County Department of Community Development/Green Gable Homes	Vancouver, WA	123	Approved
Commercial Development: construct community health hospice facility	Clark County Department of Community Development/Sterling Design, Inc.	Vancouver, WA	124	Approved
Recreational Development: relocate 15 acre golf driving range	Clark County Department of Community Development/Design Associates	Vancouver, WA	125	Approved
Parking Lot Construction: construct 155 parking spaces on 13.5 acre parcel that includes a wetland	Clark County Department of Community Development/Nlight Photonics Corporation	Vancouver, WA	126	Approved
Utility Construction: install an in-line inspection launcher facility for an existing 20 inch natural gas transmission pipeline on 2.54 acres	Clark County Department of Community Development/Northwest Pipeline GP	Washougal, WA	168	Approved
Radio Antennae Installation: install radio antennae and base on 0.55 acre	Clark County Department of Community Development/Sprint Spectrum LP, Sprint Nextel, and Stephen B Meadows & Assoc, Inc.	Brush Prairie, WA	111	Approved
Subdivision Development: divide 2.44 acres into 12 single family homes	Clark County Department of Community Development/Sterling Design, Inc.	Vancouver, WA	127	Approved
Dock Construction and Ramp Replacement: enlarge dock and replace ramp within 100-year floodplain of Columbia River	Clark County Department of Community Development/Individual	Vancouver, WA	128	Approved
Building Conversion and Construction: construct a storage/shop building and convert a single family dwelling into an office	Clark County Department of Community Development/Individual	Vancouver, WA	129	Approved

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Commercial Development: divide 1.94 acres into three lots for commercial development	Clark County Department of Community Development/Venia Holdings, Inc.	Vancouver, WA	130	Approved
Cell Tower Construction: construct 150 foot cell tower and associated ground equipment, within a 30 foot by 45-foot fenced area	Clark County Department of Community Development, Verizon Wireless, LLC	Brush Prairie, WA	112	Approved
School Construction: construct and operate an 8,000 square foot nursery/preschool on approximately one acre	Clark County Department of Community Development/LJS Investors, LLC	Vancouver, WA	131	Approved
Subdivision Development: divide 4.86 acres into 32 single family residential lots	Clark County Department of Community Development/Thousand Hills Holdings, LLC	Vancouver, WA	132	Approved
Stormwater Facility Expansion: expand and reconfigure storm water facility	Clark County Department of Environmental Services	Vancouver, WA	133	Approved
Wetland Rehabilitation: rehabilitate existing wetland in the headwaters area of the St. Johns Sub-Basin area of Burnt Bridge Creek	Clark County Department of Environmental Services	Vancouver, WA	134	Approved
Stormwater Facility Retrofit: combine two stormwater facilities and replace bio-swale/infiltration basins with large rain garden	Clark County Department of Environmental Services	near Five Corners area of Vancouver, WA	117	Approved
Stormwater Facility Expansion: expand and reconfigure three storm water facilities to create one facility	Clark County Department of Environmental Services	Salmon Creek area of Vancouver, WA	115	Approved
Wetland Mitigation Project: mitigate wetlands on 4.35 acres	Clark County Department of Environmental Services	North of Riveridge area of Vancouver, WA	163	Approved
Stormwater Facility Expansion: construct a wetland stormwater treatment facility	Clark County Department of Environmental Services	Vancouver near Sunnyside-Walnut Grove, WA	118	Approved

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Rain Garden Installation: replace bioswale stormwater facilities with rain gardens	Clark County Department of Environmental Services	near Brush Prairie, WA	113	Approved
Waterline Installation: install eight-inch waterline to subdivision	Clark County Department of Environmental Services/Individuals	Vancouver, WA	135	Approved
Park Development: develop 5.6 acres into neighborhood park	Clark County Department Public Works	Vancouver, WA	136	Approved
Road construction: improve roadway, bike lanes, sidewalk, drainage and stormwater facilities	Clark County Department of Public Works	Vancouver, WA	137	Approved
Bridge repair and stream stabilization: repair Dayton Bridge, install scour protection and bank stabilization	Clark County Department of Public Works	Amboy, WA	90	Approved
Chelatchie Prairie Rail with Trail Project: construct initial one-mile segment starting from Battle Ground Lake State Park	Clark County Department of Public Works	near Battleground, WA	109	Under Construction
Road, Bridge, Bicycle and Pedestrian Improvements: improve various roads, bridges, and bicycle and pedestrian facilities throughout Clark County	Clark County Department of Public Works	Various locations throughout Clark County, WA	106	Proposed
Fourth Plain Transit Improvement Project: improve Fourth Plain Boulevard's capacity for buses and add bike and pedestrian facilities	C-Tran	Vancouver, WA	139	Proposed
Modify School Sporting Facilities: convert grass field into turf, resurface tennis courts, add soccer field and parking, hardscape pedestrian paths	Battleground School District No. 119	Vancouver, WA	140	Approved
Road Improvement and storm water facilities: improve roads and build storm water and sewer facilities	City of Battleground	Battleground, WA	110	Approved

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Road and Stormwater Facility Construction: construct and expand roadways including associated storm water facilities	City of Camas Public Works	Camas, WA	165	Approved
Office Building Construction: construct two office buildings on 11.1 acres	City of Camas Planning Division/Fisher Creek Campus, LLC	Camas, WA	166	Approved
Park Development: construct park center, restroom facilities and parking facilities	City of Ridgefield	Ridgefield, WA	96	Approved
Park improvements, acquisitions, and construction projects: improve, acquire land for and construct various park sites throughout the City of Ridgefield	City of Ridgefield	Ridgefield, WA	97	Proposed
Public Works Operations/Police Facility: renovate existing building and acquire additional land for construction of a new operations facility that includes space for Police Department expansion	City of Ridgefield	Ridgefield, WA	98	Proposed
New City Hall Planning and Design: develop space needs analysis for new City Hall building	City of Ridgefield	Ridgefield, WA	99	Proposed
Portable Buildings Procurement: purchase stand alone portable buildings for City staff expansion	City of Ridgefield	Ridgefield, WA	100	Proposed
Upgrade or Modify Wastewater Treatment Plant: determine whether to connect to Salmon Creek Treatment Plant or upgrade existing wastewater treatment plant	City of Ridgefield	Ridgefield, WA	101	Proposed
Main Street Road Improvements: construct bridge, grade and pave Main Street, and install traffic signals	City of Ridgefield/Port of Ridgefield	Ridgefield, WA	102	Approved

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
Water Source, Storage, Transmission and Distribution Improvements: improve water source, storage, transmission and distribution systems throughout City of Ridgefield	City of Ridgefield	Ridgefield, WA	103	Proposed
Road Improvements: complete mobility, safety and general improvements to roads in and around the City of Ridgefield	City of Ridgefield	Ridgefield, WA	104	Proposed
Commercial development: construct 6,900 square-foot building with 42 parking spaces	City of Vancouver/America Tire's	Vancouver, WA	142	Approved
Commercial development: construct 51,833 square-foot office building and add 70 parking stalls	City of Vancouver/Columbia Tech Center LLC	Vancouver, WA	143	Approved
Commercial development: construct six industrial buildings totaling 35,616 square feet	City of Vancouver/Delta Management	Vancouver, WA	144	Approved
Commercial development: construct 18,000 square-foot office building and 59 parking stalls	City of Vancouver/Individual	Vancouver, WA	145	Approved
High school construction: construct High School and 97 parking spaces	City of Vancouver/LSW Architects for Evergreen Public Schools	Vancouver, WA	146	Approved
Building construction: construct 26,267 square-foot building for Vancouver School District Maintenance Department and 180-190 parking spaces	City of Vancouver/LSW Architects for Vancouver Public Schools	Vancouver, WA	147	Approved
Commercial development: construct three office buildings totaling 231,400 square-feet with parking for 575	City of Vancouver/Prematic Services Corporation	Vancouver, WA	148	Approved

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
Building demolition; electrical building and silo construction: demolish 343,000 square-foot storage building, construct a 375 square-foot electrical building and construct three 92 foot outside diameter concrete silos	City of Vancouver/United Grain Corporation	Vancouver, WA	149	Approved
Sand removal and transport: remove 116,000 cubic-yards of sand from 18.7 acres and transport to another site	City of Vancouver/Farwest Steel	Vancouver, WA	150	Approved
Sewer line installation: install 1,372 feet of new sewer line	City of Vancouver	Vancouver, WA	151	Approved
Water transmission main installation: install 12,800 feet of potable water transmission main pipe	City of Vancouver	Vancouver, WA	152	Approved
Road Improvements: improve various roads throughout the City of Vancouver, WA	City of Vancouver	Vancouver, WA	153	Proposed
Commercial development: proposed Wal-Mart Shopping Center on south side of NE Fourth Plain Boulevard, east of 140th Avenue in Vancouver, WA	City of Vancouver Community Development	Vancouver, WA	154	Proposed
Chinook Neighborhood Park Development (North Salmon Creek): develop park to include playground equipment, trails, picnic tables, landscaping, a sports court, and benches	Vancouver-Clark Parks and Recreation	Salmon Creek area of Vancouver, WA	116	Approved
Burnt Bridge Creek Build Out with Roundabout: improve roads between NE 137th and NE 162nd Avenue and Burnt Bridge Creek and NE Fourth Plain Boulevard	City of Vancouver Public Works	Vancouver, WA	155	Proposed

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Stormwater Capital Improvement Program (SCIP) Projects: various SCIP projects throughout the City of Vancouver to install sanitary sewers for residential homes	City of Vancouver Public Works	Vancouver, WA	156	Proposed or Under Construction
Sanitary Sewer Projects: various sanitary sewer projects throughout the City of Vancouver, WA	City of Vancouver Public Works	Vancouver, WA	157	Proposed or Under Construction
Water Projects: various water facility/transmission line improvements and upgrades throughout the City of Vancouver, WA	City of Vancouver Public Works	Vancouver, WA	158	Proposed or Under Construction
Surface Water Projects: numerous projects to improve surface water quality throughout the City of Vancouver, WA	City of Vancouver Public Works	Vancouver, WA	159	Proposed or Under Construction
Install pedestrian trail: install 3,463 foot pedestrian trail with two pedestrian bridges	City of Washougal	Washougal, WA	169	Approved
Multnomah County				
USS Ranger, Chinook Landing Marine Park: Develop this retired U.S. aircraft carrier as an aircraft carrier museum, with a conference center, and event venue at Chinook Landing Marine Park.	Metro/City of Fairview	Fairview, OR	172	Proposed
40-Mile Loop Trail undeveloped section; A planned segment of the 40-Mile Loop Trail about 6 miles long through the Reynolds Industrial Park that connects the Marine Drive portion of the trail with the Reynolds portion of the trail.	40-Mile Loop Land Trust	Fairview and Troutdale, OR	173	Proposed
Lewis County				

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
Sewer System Upgrade Project: complete design of sewer system upgrades	City of Vader	Vader WA	1	Proposed
Ports				
Dock improvement and replacement: improve one dock and replace another	Port of Camas-Washougal	Washougal, WA	170	Approved
Kalama Energy Center: construct a new 346-MW natural gas-fired power plant on a 20-acre site at the Port	Port of Kalama/Energy Northwest	Kalama, WA	77	Approved
Rail line development: develop rail lines within Port of Longview boundaries	Port of Longview	Port of Longview, WA	69	Proposed
Waterfront development: develop waterfront property within Port of Longview boundaries	Port of Longview	Port of Longview, WA	70	Proposed
Industrial facility and infrastructure development: develop industrial facility and infrastructure development on Port of Longview's Barlow Point property	Port of Longview	Barlow Point property owned by Port of Longview, WA	71	Proposed
Columbia River Dredging: request for approval of several dredging events, 10 year authorization to conduct annual maintenance dredging and to deposit dredged sediment at river mile 62 or 56	Port of Longview	Port of Longview, WA and Main stem Columbia River between Rivermile 66 and 67	72	Approved
Site preparation and road construction: regrade site for use as a motocross track and sand drag strip; construct a 3,500 ft, 20 ft wide maintenance access road	Port of Longview	Longview, WA	61	Approved
Planning Phase 11 Troutdale Industrial Park: redevelop lands surrounding the Troutdale Airport including road and utility improvements	Port of Portland	Troutdale, Oregon	171	Proposed

Project	Lead Agency/Applicant	Location	Map ID¹ (see Map 26-1)	Status²
West Vancouver Freight Access Rail Project: expand rail line and access	Port of Vancouver	Vancouver, WA	160	Approved
Warehouse Remodel: remodel 169,000 square-foot warehouse and support office	Port of Vancouver	Vancouver, WA	161	Approved
Terminal 5 Bulk Potash Handling Facility: construct potash storage and shipping facility at Terminal 5	Port of Vancouver	Vancouver, WA	162	Approved
Troutdale Energy Center Project: construct a 653 MW natural gas-fired power plant	Troutdale Energy Center, LLC.	Port of Portland property in Troutdale, OR	175	Proposed
Utilities				
Water Transmission and Service Facilities: install water transmission and service facilities to connect Meadow Glade Reservoir to Battle Ground intertie water main	Clark Public Utilities	Vancouver, WA	138	Approved
Substation Construction: construct Enterprise 115-kV substation	Clark Public Utilities	near La Center, WA	93	Approved
Construct New Substation: along West Side Highway in Lexington to replace the existing John Street substation	Cowlitz Public Utility District	Lexington, Cowlitz County, WA	15	Proposed
Construct Transmission Line: construct 0.5 mile transmission line along Ocean Beach Highway to connect Baker's Corner Substation to BPA's Longview-Lexington 115-kV Line	Cowlitz Public Utility District	Longview, WA	68	Proposed
Construct Transmission Line: construct a new transmission line in Kelso in 2013; placement is dependent on the route selected for the BPA I-5 Corridor Reinforcement Project	Cowlitz Public Utility District	Kelso, WA	20	Proposed

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
Rebuild and Upgrade Substation: rebuild and upgrade the East Kelso Substation	Cowlitz Public Utility District	Kelso, WA	21	Proposed
Rebuild and Upgrade Substation: rebuild and upgrade the West Kelso Substation	Cowlitz Public Utility District	Kelso, WA	22	Proposed
Construct Transmission Line: construct a new 230-kV transmission line from BPA's Longview Substation to the proposed Natural Gas Generation Facility at the Port of Kalama; project is dependent on Energy Northwest building the Natural Gas Generation Facility	Cowlitz Public Utility District	Longview, WA to Kalama, WA	73	Proposed
Speelyai Creek Fish Hatchery Repair and Upgrade: upgrade and repair Speelyai Creek Fish Hatchery; replace kokanee fish trap with precast concrete trap	PacifiCorp Energy	Ariel, WA	82	Approved
Recreational Development: upgrade Cresap Bay campsites and make shoreline universally accessible	PacifiCorp Energy	East end of Lake Merwin near Yale, WA	80	Approved
Construct Fish Release Pond: construct a fish release pond on the shore of the Lewis River including an intake pipe for water circulation and release pipe to release fish	PacifiCorp Energy	Woodland, WA	88	Approved
Construction for Lewis River Fish Passage Projects: construct adult fish collection facilities at Merwin Dam and transport them upstream of Swift Dam to spawn; collect smolts at Swift Dam by floating surface collector and transport downstream to release facility	PacifiCorp Energy	Various locations along Lewis River, Cowlitz County, WA	83	Under Construction
Hatchery Maintenance and Improvements: complete ongoing maintenance and improvements at Lewis River Fish Hatchery	PacifiCorp Energy	Lewis River Fish Hatchery, Cowlitz County, WA	83	Proposed

Project	Lead Agency/Applicant	Location	Map ID ¹ (see Map 26-1)	Status ²
Hatchery Maintenance and Improvements: complete ongoing maintenance and improvements at Merwin Fish Hatchery	PacifiCorp Energy	Merwin Fish Hatchery, Cowlitz County, WA	81	Proposed
<p>Notes:</p> <p>1. The Map ID for each project reflects the numeric identifiers for projects shown on Map 26-1. Project 141 was discovered to be a duplicate and was deleted from this table.</p> <p>2. Proposed = project has been formally proposed, but has not been approved by appropriate authorizing agency; Approved = project has been approved by appropriate authorizing agency, but construction is not underway; Under Construction = project has been approved and construction is underway.</p> <p>Sources: City of Vancouver 2011; Clark County Community Development 2011; Clark County Public Works 2011a, 2011b; Clary 2011; Cowlitz Tribe 2011; Cowlitz-Wahkiakum Council of Governments 2011b; C-Tran 2001; Durshpek 2011; Ecology 2011c; Eiken 2011; FHA 2011; Hendriksen 2011; Hermen 2011; Hickerson 2011; Hillger 2011; Jansen 2011; Johnson 2011; Johnston 2011; Malon 2011; Mattiz 2011; Nielsen 2011; Nye 2011; Rogers 2011; Vancouver-Clark Parks and Recreation 2011; WSDOT 2011</p>				

26.3 Cumulative Impacts Analysis

This section provides the analysis, by resource, of the cumulative impacts of past, present, and reasonably foreseeable future actions described in Section 26.2, Cumulative Actions, in combination with the potential impacts of the I-5 project (Step 4). The following analysis describes these potential cumulative impacts in the order that the affected resources are presented in Chapters 5 through 22 of this EIS. For some resources, cumulative impacts would be approximately the same across all action alternatives. For other resources, cumulative impacts would vary by alternative. For these resources, general cumulative impacts are discussed, along with potential cumulative impacts specific to one or more alternatives.

26.3.1 Land

The spatial boundary for the following analysis consists of the general vicinity of the proposed project, and more broadly the three counties that would be crossed by the project (Cowlitz, Clark, and Multnomah counties).

Land use has incrementally changed due to cumulative past and present development, and this trend would be expected to continue with the cumulative future development identified in Section 26.2.2, Reasonably Foreseeable Future Actions. Past and present actions have cumulatively established the current land use patterns in Cowlitz, Clark, and Multnomah counties. These actions have created many land uses (see Section 26.2.1, Past and Present Actions). Urbanized use is expanding with population and economic growth, generally on the periphery of already established developed areas, and there is no evidence of any shift in trends. In addition, many of the reasonably foreseeable commercial uses identified in Table 26-2, such as office buildings, retail locations, and associated parking lots, are proposed as “infill” development on currently vacant land designated for commercial use by local land use planning documents. Assuming these trends continue, land would continue to be converted from rural to developed uses, and urban uses would continue to be intensified within already developed areas.

Land use also has been cumulatively affected by development of transportation and utility infrastructure. WDNr, in particular, has expressed concern over the cumulative impact of past, present, and reasonably foreseeable future infrastructure development on state trust lands that it manages or owns (see Appendix A for more information on WDNr lands in the project area). In addition to numerous roads, railroads, pipelines, and transmission lines, development of energy projects and port development has occurred and is expected to continue, such as the activities proposed for Longview and Kalama.

Because transmission lines typically have relatively small footprints and, other than the transmission structures, span other land uses, the proposed project would not be expected to cumulatively contribute to any changes in existing land use in areas outside of the transmission line right-of-way. For instance, adjacent agricultural areas would still be used for agriculture, timber areas would remain as timber areas, and residential areas would continue to be residential. The proposed project would, however, cumulatively add to the presence of developed uses and the on-going development of utility-related land uses. From a strictly land use perspective, the overall contribution of the West Alternative to this cumulative impact could be considered less than the other three alternatives since the West Alternative would largely follow existing transmission lines within an existing right-of-way, while the Crossover Alternative

would require entirely new transmission right-of-way for over half its length, and the East and Central alternatives would require entirely new transmission right-of-way for almost their full length. The West Alternative thus could be considered less of a contrast with established adjoining uses as compared to the other three alternatives.

Since all action alternatives pass through currently forested areas, the project also would contribute to the cumulative reduction of undeveloped forested uses by removing trees from the transmission line right-of-way and access roads. The East Alternative would have the greatest contribution to this cumulative impact, followed closely by the Central Alternative, then the Crossover Alternative, and finally the West Alternative. Furthermore, areas occupied by the proposed transmission towers, access roads, and other facilities would not be available for timber harvest, agricultural, or other uses during the life of the line, and the presence of these facilities could affect the ability of landowners to further develop these portions of their properties for other uses in the future. Regardless of the action alternative selected, BPA would obtain transmission easements for operation of the proposed project on private lands, and would obtain right-of-way grants to cross state lands.

Overall, because the proposed project would introduce a new utility facility and would remove the sites of proposed towers, access roads, and substations from other uses, the proposed project would contribute incrementally, though in a relatively minor way, to potential cumulative land use impacts. The proposed project's incremental contribution to potential cumulative impacts to land ownership would also be minor given the relatively small amount of land BPA would purchase.

26.3.2 Recreation

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

There are many recreational areas—mainly parks, trails, and golf courses—in the project area (see Chapter 6, Recreation). There are also dispersed authorized and non-authorized recreational uses, such as hunting, target practice, hiking, biking and ATV use, occurring predominately in the eastern and northern portions of the project area. While some past and present actions have increased recreational access and opportunities, some recreational-related actions have introduced human uses and development in otherwise natural areas and viewsheds, which can be viewed as having diminished the recreational experience for some recreational users.

Similarly, some of the reasonably foreseeable actions in Table 26-2, such as park acquisitions and improvements in the City of Ridgefield and development of bicycle and hiking trails throughout Clark County, would cumulatively increase opportunities for recreation in the general vicinity. However, other reasonably foreseeable actions, such as timber harvests on WDNR and private lands, could cumulatively reduce opportunities for recreation or interfere with recreational experiences, particularly for dispersed recreation.

In general, the project would not contribute to cumulative impacts to recreational use in the vicinity because the transmission line would have a relatively small footprint and, other than the transmission towers, would span other land uses such as recreation. The action alternatives also generally avoid established recreational sites, but depending on the alternative, cross a mix

of parks, trails, and golf courses. In addition, in some urban and suburban settings, transmission line rights-of-way provide recreational opportunities as a form of informal linear “park” for walking, hiking, and jogging.

However, the project could contribute to cumulative impacts on the recreational experience in areas where it would introduce a developed utility feature to a more natural landscape, where people seeking a more natural experience could be pursuing recreational pursuits such as hiking, hunting, or camping. Development of new access roads and improvements to existing access roads also may increase access by motorized users to some areas difficult to access or inaccessible to these users, which could also contribute to cumulative impacts on the recreational experience of non-motorized users in these areas. Because the West Alternative would be developed generally along an existing transmission corridor and through several already developed areas, it would contribute the least from among the action alternatives to this potential cumulative impact. The Central and East alternatives, with their similar lengths of required new right-of-way and amounts of forested and other undeveloped lands that would be affected, would have the greatest contribution to this cumulative impact. Because the Crossover Alternative uses existing right-of-way for its northern portion and new right-of-way for most of its southern portion, its contribution to this cumulative impact would fall between the contributions of the other action alternatives. The actual extent of the project’s contribution to cumulative impacts on the recreational experience would depend on the proximity of recreational users to the new line and their sensitivity to its presence in the landscape, among other factors.

For these reasons, the project would contribute incrementally, though in a relatively minor way, to potential cumulative impacts on recreational uses, generally through potential contributions to cumulative impacts on dispersed recreational experiences in the area.

26.3.3 Visual Resources

The spatial boundary for the following analysis consists of the viewsheds in the general vicinity of the proposed transmission line routes and substations from which the cumulative actions identified in Section 26.2, Cumulative Actions, could be seen in combination with the proposed project.

Past and present development and land management activities have cumulatively changed the visual landscape and visual features by introducing man-made elements and altering natural forms. These changes include urbanization along the Columbia River; rural residential development, agriculture, timber clearing and harvest, development of hydroelectric facilities along the Lewis River; and the development of area roads and utility infrastructure. Reasonably foreseeable future actions involving development and resource use would continue this trend. Reasonably foreseeable residential development likely would further encroach into open spaces that are currently considered to have intrinsic scenic value. As new residents move into the area and greater numbers of sensitive viewers perceive cumulative changes in the landscape, existing and new developments may be received more negatively.

The cumulative visual effect of the proposed project in combination with other past, present, and reasonably foreseeable actions would be highly dependent on viewpoint locations, the extent of existing visual modification that is already visible from a particular location, and the sensitivities of viewers. The area near the West Alternative, with its existing transmission lines and greater urban and suburban development, has already had more cumulative visual

modifications than areas near the other action alternatives. Thus the incremental cumulative visual modifications of adding the West Alternative in or adjacent to existing transmission corridors would be less than adding it to areas with no existing lines. However, the West Alternative also has the greatest number of viewers who would see the new line. The cumulative impact of the views of the additional right-of-way on the greater number of viewers is tempered somewhat by the existing developed landscape, where residents in the urban and suburban areas of the alternative are more accustomed to seeing a transmission line than the rural residents near the East Central and Crossover alternatives, although there are far fewer residents near those alternatives.

Overall, due to its location generally along an existing transmission corridor and through several already developed areas, the West Alternative would contribute incrementally, though in a relatively minor way, to potential cumulative visual impacts in the area. Similarly, the Crossover Alternative, in the portion that uses existing right-of-way, would also contribute incrementally to cumulative impacts. Because the East and Central alternatives and portions of the Crossover Alternative would pass through previously undeveloped areas and require new cleared rights-of-way, these alternatives would have the potential to have a relatively high level of contribution to cumulative visual impacts from vantage points along these routes.

26.3.4 Electric and Magnetic Fields

The spatial boundary for the consideration of cumulative electric and magnetic field (EMF) levels is fairly narrowly defined due to the rapid drop-off in EMF levels over distance that would occur from the proposed transmissions line. In general, EMF levels from a 500-kV transmission line drop off to barely detectable levels at a distance of approximately 300 feet from the centerline of the transmission line (see Chapter 8, Electric and Magnetic Fields). Therefore, only cumulative actions within this distance with the potential to result in combined EMF levels are considered to be within the spatial boundary for the cumulative EMF analysis.

EMF levels in the vicinity have cumulatively increased over time as a normal part of urbanization and electrical use. Cumulative EMF levels vary greatly throughout the area, depending on proximity to existing EMF-generating sources. In general, existing cumulative EMF levels are expected to be higher along the West Alternative than along other alternatives since the West Alternative would generally follow already existing high-voltage transmission lines that currently generate EMF. This would also be true of the portion of the Crossover Alternative that would use existing right-of-way.

The proposed new line and substations would introduce new or additional sources of EMF along new or existing right-of-way, which could incrementally increase cumulative EMF levels in these areas, depending on the location and line configurations. In areas where no transmission lines currently exist and new right-of-way would be established, cumulative EMF levels would be expected to increase. Where the proposed line would be built along existing right-of-way any change in EMF levels would depend on the configuration of the new line in relation to any existing lines. Overall in these situations, however, only slight increases, or possibly even decreases, in cumulative levels would be expected. Relative increases in exposure would depend on the amount of existing EMF, the amount of EMF increase with the project, and the number of persons accessing the immediate project area.

26.3.5 Noise

The spatial boundary for the cumulative noise analysis consists of the immediate area of the proposed transmission line routes and substations where noise from the proposed project could be heard in combination with noise from the cumulative actions identified in Section 26.2, Cumulative Actions.

Cumulative noise impacts occur when actions are undertaken simultaneously and relatively close to each other. Past and present actions in the immediate project area only have the potential to have a combined cumulative noise effect with the proposed project to the extent that they are continuing to generate or result in noise today. Typical examples of such past and present actions are existing area highways and major thoroughfares (with their traffic-generated noise), existing railroads (with noise from trains and road crossing equipment), existing industrial or commercial facilities (with noise from ongoing operations), and existing power generation plants (also with noise from ongoing operations). In addition, other present actions that could combine with the proposed project to cause cumulative noise impacts generally include any long-term highway construction or improvement projects, on-going commercial or residential building construction projects, and on-going timber harvest activities in the immediate project area.

These past and present actions have cumulatively created increased ambient noise levels, although these cumulative increases are location dependent. In urban areas and near freeways, ambient noise levels from cumulative actions are typically higher, while in forested and rural areas, they are typically lower. However, even within each of these different areas, there can be significant differences in noise levels, depending on how many actual noise generation resources are present.

Reasonably foreseeable future actions that could contribute to cumulatively-increased noise levels include new commercial and residential development, on-going road maintenance activities, and construction and installation of utilities and other similar infrastructure.

The proposed project's contribution to cumulative noise levels in the immediate project area would primarily occur during construction. When construction is occurring at a particular location, noise from construction activities would temporarily add to noise from other activities in the immediate area, such as from traffic on area roads, commercial/industrial activities, and railroad operations. The project thus could contribute incremental, short-term adverse cumulative noise impacts at any given location along the transmission line route. Once the line is built, corona-generated noise from the transmission line also could contribute incrementally, though in a relatively minor way, to cumulative noise impacts in areas near the line and substations.

26.3.6 Public Health and Safety

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

A number of past, present, and reasonably foreseeable actions in Cowlitz, Clark, and Multnomah counties have and could cumulatively contribute to public health and safety impacts, such as increased risk of traffic accidents, fire risk, immediate risks from accidental releases of

hazardous or toxic materials, longer-term risks from such materials in the environment from past activities and disposal, and worker safety risks. In addition, there is an increased risk of many types of extremely rare yet potentially catastrophic events, such as pipeline explosions, bridge collapse, downed power lines, and train derailments that could occur at some point. These cumulative impacts reflect that development, urbanization, and modern society inherently bring increased levels of potential risk to human health and safety.

Given the many safety precautions that would be taken during construction, the proposed project would not significantly contribute to cumulative public health and safety risks or impacts. As discussed in Chapter 10, Public Health and Safety, workers constructing the project would be highly trained in working with and around high-voltage transmission lines, and would work to ensure that all safety protocols are followed. Workers also would follow current hazardous and toxic materials handling, transport, use, and storage regulations and would not contribute to cumulative soils or groundwater contamination issues at previously contaminated sites. In the event of a spill, all materials and exposed soils would be removed and restored. In addition, the line would be designed to minimize the potential for safety issues during its lifespan.

Even with safety measures in place for the project, there is the potential for unintended or accidental risks to public health and safety to arise. The proposed project could slightly increase the overall cumulative risk of injury to the public that could occur during construction vehicle traffic and congestion and also increase the risk of fire in construction areas. In addition, for action alternatives that would be partially located in areas with ongoing timber harvest practices (mainly the East and Central alternatives and part of the Crossover Alternative), construction would contribute to health and safety risks from tree felling and use of roads through the area from these practices. Overall, because of this increased potential for accidents, the proposed project would contribute incrementally, though in a relatively minor way, to potential cumulative public health and safety impacts.

26.3.7 Socioeconomics

The spatial boundary for the consideration of cumulative socioeconomic impacts consists of the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties), although it is possible that the proposed project also could contribute to cumulative effects on employment and income in surrounding counties within the same regional labor market, such as the Seattle-Tacoma-Olympia Economic Area and the Portland-Vancouver-Beaverton Economic Area.

The analysis of socioeconomic effects contained in Chapter 11 of this EIS largely takes into account past and present actions in the region that have had a cumulative effect on socioeconomic considerations such as population, employment, income, housing, property values, and public services. Accordingly, the cumulative past and present actions have set the baseline for socioeconomic conditions within the counties where the proposed project would be located. Reasonably foreseeable future actions are identified in Table 26-2. Future actions that could contribute to cumulative socioeconomic impacts include those that would generate employment or income, increase demand for housing and public services, result in population changes, or impact property values. Typical examples include residential construction, commercial and industrial/utility construction, port improvements, major road projects, and increased timber harvest activities.

The action alternatives would not change population or the need for permanent housing, and thus would not contribute to cumulative impacts related to these socioeconomic considerations (see Chapter 11, Socioeconomics). However, there likely would be a need for temporary lodging for construction workers during construction for any workers not hired from the local area. Several of the reasonably foreseeable future actions in Table 26-2, such as the Columbia River Crossing Project, commercial development in the City of Vancouver, and the Kalama Energy Center, involve significant construction activities that could also involve construction workers from outside the local area. These reasonably foreseeable construction activities could cumulatively increase the demand for temporary housing and occupancy rate in the area. These impacts would be cumulatively beneficial as they would increase lodging-related revenue and other ancillary businesses such as restaurants, grocery stores, laundromats, gas stations, and other businesses necessary to support temporary construction workers.

The employment created would be temporary jobs that would last only through project construction (see Chapter 11). The project could also result in some minor indirect and incidental employment creation, primarily in the service industry. If construction coincides with construction-related activities from other reasonably foreseeable future actions, such as those described above, this would increase the number and/or duration of temporary construction jobs, which would increase the cumulative need for temporary construction workers in the area. Perhaps the most significant reasonably foreseeable future action in the three counties over the same time frame is the Columbia River Crossing Project, which could compete with the proposed project for the steelworker labor market. If the pool of available construction workers is limited locally, it will result in construction workers traveling from other areas to work sites. The impact of hiring local workers, though preferable for many reasons, would reduce the benefits described above for temporary lodging needs. Nonetheless, the proposed project, along with the reasonably foreseeable future actions, would have beneficial impact on employment in the area. When combined with indirect spending from increased employment, construction jobs could also assist in lowering the overall unemployment rates, at least temporarily, for the three counties.

While beneficial, local project-related expenditures, employment, and construction-related earnings would be relatively small relative to the total amount of economic activity in the affected counties, and would, as a result, make a small positive contribution to cumulative impacts on the local economy for the duration of construction. Other reasonably foreseeable projects would make similar positive, yet relatively small contributions to the local economy, although some local communities and immediate areas where construction of these projects is taking place may see a more significant beneficial impact on the local economy. The proposed project would also generate sales tax in the affected counties as workers purchase goods and services, and this would likely be the case with other construction projects in the affected counties. Overall, the cumulative actions combined with the proposed project would have a beneficial cumulative effect on the local economy.

Cumulative effects on property values are difficult to estimate and location specific. Some cumulative projects could have a detrimental effect on property values, while others could serve to increase such values. In addition, it is difficult to distinguish and isolate the effect on property values from a particular project from the myriad of other factors that can affect property values, such as overall market conditions, potential buyer preferences, and local economic conditions. Nonetheless, as discussed in Chapter 11, the proposed project would not have a statistically significant effect on property values, and thus would make only minor

contributions to any cumulative effect on property values with the other cumulative actions identified in Section 26.2, Cumulative Actions.

The proposed project would not cause significant demands on public services or facilities. During construction, public services such as police, fire, and medical facilities, would be needed only in cases of emergency, which would likely be the case with other construction projects that could potentially coincide with the proposed project. In addition, the proposed project would not have a noticeable adverse impact on local landfill resources or their ability to handle other current or future waste streams. Therefore, the proposed project would not contribute to cumulative impacts to public services or facilities.

26.3.8 Transportation

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Past actions that have cumulatively affected transportation include the development of highways, local roads and railroads; construction and operation of Columbia River dams and locks; construction and operation of various airstrips; and traffic from residential and commercial development. Present transportation-related actions in the vicinity include ongoing road maintenance projects, and transportation of freight by railroad, barge, and aircraft. Reasonably foreseeable future actions that could affect transportation include ongoing road maintenance activities, continuing residential development (particularly in more rural areas), commercial development and ongoing logging activities that would generate increased traffic volumes on local roads.

Reasonably foreseeable future actions with cumulative impacts to transportation would include any large new construction projects (e.g., the Columbia River Crossing Project) that would increase traffic on the same roads used in connection with the proposed project that is not already accounted for in existing traffic and road infrastructure, and residential, commercial, and industrial development that would increase the number of originating trips using area roads. Furthermore, while ongoing and reasonably foreseeable road improvement projects ultimately would have an overall beneficial cumulative effect by accommodating greater traffic volume and providing additional options for travel routes, these projects would contribute to adverse cumulative traffic effects during their construction phases due to road and lane closures, detours, and speed limitations. Since most road construction projects usually occur in the spring through fall months due to weather, it is likely that road construction projects, along with construction-related traffic from the proposed project, would have a cumulative effect on roadways. Although this cumulative effect would be temporary, it could be viewed as significant to local motorists.

In general, traffic associated with operation and maintenance of the proposed transmission line and substations would not cumulatively affect transportation along any of the action alternatives over the life of the project because this traffic would normally require a few maintenance and inspection vehicles a few times a year and helicopters twice a year. If infrequent line repair is needed, larger vehicles such as flatbed trucks or a crane could be required to bring in equipment and repair or replacement parts. Larger vehicles may also be used infrequently to transport equipment to a substation. Using these larger vehicles

potentially could cause minor disruptions to local traffic for brief periods, which could contribute to temporary and minor cumulative impacts for all action alternatives.

Reasonably foreseeable future actions in the vicinity of the project that involve road improvements, along with the proposed project, also would cumulatively increase the number of improved access roads in the regional landscape. This project's contribution to this cumulative impact would be greatest for the East and Central alternatives, where there are currently relatively fewer improved roads. This increase would likely provide for greater ease of access to portions of the project area, which may prove beneficial to the owners of land where the new access roads would be located. However, it is likely that more road maintenance activities would be required, as well as greater efforts to control noxious weeds. Because BPA would work with landowners and others to ensure that safe vehicle and equipment access across BPA's easements is provided, the proposed project would not contribute to any cumulative property access impacts. Overall, however, the proposed project would contribute incrementally, though in a relatively minor way, to potential cumulative transportation-related impacts.

26.3.9 Cultural Resources

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Cultural resources have been and are being cumulatively affected because of past and present development and activities. These cumulative impacts include disturbance of cultural sites, reduction of the cultural integrity of certain sites, and removal of cultural artifacts. Past actions that have affected cultural resources include construction and operation of hydroelectric facilities, agricultural activities, timber harvest activities, highway and railroad construction, construction and operation of existing transmission lines, and commercial, industrial, and residential development. Present and ongoing activities add to these impacts. These continued forms of development, including construction of this project within the viewshed of ethnographic resources, may negatively affect the use of these areas by local area Tribes. Continued conversion of native vegetation to agricultural land, timber harvest land, or development decreases the amount of land Tribes can use for native plant gathering.

During construction of the proposed project, there is also the potential to affect undiscovered archaeological resources. Mitigation measures would lessen or avoid the potential for impacts on archaeological resources (see Table 3-2). However, the project may still contribute incrementally to the adverse cumulative impact on cultural resources in the area.

26.3.10 Geology and Soils

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Past and present actions have cumulatively affected soil resources, resulted in soil erosion and compaction, and in some cases altered topography. These activities include logging, agriculture, urbanization, and recreational use (e.g., off-road vehicle use). These activities are likely to continue to occur in the future. Reasonably foreseeable logging, agriculture, and residential and

other development would contribute to cumulative soil erosion and compaction in the area, and development projects in particular may alter the topography. However, increased regulation and the use of BMPs have reduced the severity of erosion from these activities such that erosion volumes and rates would be lower than what occurred from similar types of activities in the past. In addition, while the construction of these reasonably foreseeable actions would cause cumulative near-term increases in erosion, as disturbed areas stabilize, there is likely to be only a minor long-term cumulative contribution to erosion. Development of urbanized uses may also incidentally reduce long-term cumulative soil erosion potential by covering the soil with impervious surfaces, such as roads, houses, and buildings.

The project's contribution to cumulative soil erosion impacts would be the greatest during construction from construction-related soil disturbance and grading, but would diminish over time as vegetation becomes reestablished and disturbed areas stabilize. Nonetheless, continuing long-term authorized and unauthorized use of transmission line rights-of-way or access roads during the life of the project would result in incremental contributions to cumulative soil erosion near project facilities. The project also would temporarily contribute to soil compaction in areas where temporary construction work would occur, such as within rights-of-way and staging areas, and would permanently (i.e., for the life of the project) contribute to cumulative soil compaction due to permanently compacted soil under tower footings, substation foundations, and access roads. In some areas, temporary compaction would be remedied by BPA after construction is complete, and in other areas, it would diminish over time as plants, animals, and weather reworked the soil. Overall, however, the project and other ongoing and reasonably foreseeable activities would cause a cumulative increase in permanent soil compaction.

Past, present, and future actions can also contribute to cumulative landslide risk by placing development on unstable slopes without taking adequate slope stabilization measures, and by increasing downslope risks from landslides. BPA is coordinating with state geologists to identify known and potential landslide risks in the project area. BPA would work to site its proposed facilities away from known landslide areas where possible, and to design any facilities in landslide areas that cannot be avoided to minimize the potential for exposing these facilities to landslides or increasing landslide risk. Thus, the proposed project would not contribute to any cumulative increases in landslide risk from ongoing and reasonably foreseeable cumulative actions.

The project would result in minor alterations to topography within the right-of-way from grading and construction of towers and roads. These effects would be localized and limited to the construction footprint of the transmission line. Soil erosion would largely be mitigated by implementation of BMPs during and following construction. Most soil compaction would be temporary; permanent soil compaction would be limited to areas under tower footings, substation foundations, and access roads. The project thus would contribute incrementally, though in a relatively minor way, to cumulative impacts related to geology and soils.

26.3.11 Water

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

The three major watersheds crossed by the project (Cowlitz, Lewis, and Salmon/Washougal) and their waters have been cumulatively affected by agriculture, urbanization, timber harvest, and many other activities over the past 150 years. These uses are likely to continue in these watersheds into the foreseeable future. Timber harvest has been a dominant activity that has cumulatively affected water resources in the watersheds crossed by the project, and dam installation on the bigger rivers, agricultural uses, and urbanization have contributed as well. Historic timber harvest practices have cumulatively affected water quality from tree removal and clearing activities that disturb soils, and from ongoing use of unpaved access roads that crisscross lands primarily in the northern and eastern portions of the project area. These activities increase sediment delivery to streams, thereby cumulatively affecting their water quality. In addition, agricultural uses and urbanization have cumulatively affected water quality by increasing sediment delivery to streams through soil disturbance and contributing contaminants from ongoing activities and accidental releases.

Historic timber harvest practices, agricultural uses, and urbanization also have cumulatively removed thousands of acres of riparian vegetation important for the long-term health of water resources in the Lower Columbia River region. In urban and agricultural areas, riparian vegetation is now thin or nonexistent (NMFS and USFWS 2006), and the state of riparian vegetation in these areas is not expected to improve in the foreseeable future.

A variety of causes have also led to cumulative water quality impairment of river and stream segments in the lowlands near the Columbia River. Many of these river and stream segments are on the Washington State 303(d) list for water temperature (see Chapter 15, Water). Debris torrent damage, recent harvest, naturally wide channels, and lack of conifer regeneration are possible explanations for these temperature exceedances (NMFS and USFWS 2006).

Reasonably foreseeable future projects involving construction in and near project area waters would contribute to the cumulative impact on these waters. However, BMPs and other mitigation measures also would be put in place to minimize the impacts of these projects, which would create less comparative contribution to cumulative impacts on project area waters than historically occurred from similar actions. In addition, reasonably foreseeable future actions aimed at improving water quality, such as the stormwater and wastewater facility development and improvement projects identified for many cities and towns throughout the area, would incrementally reduce overall cumulative impacts on water resources (see Table 26-2).

The proposed project would contribute to cumulative water resource impacts by increasing sediment delivery to streams from construction activities and ongoing use of unpaved roads. The proposed project also could lead to cumulatively increased water temperature along some streams crossed by the transmission line from decreased riparian shade where trees would need to be cleared for the new line. In terms of the number of new river and stream crossings by the proposed transmission line right-of-way and by proposed new access roads outside of this right-of-way, the contribution to these cumulative impacts would be greatest from the Central (about 301) and Crossover alternatives (about 297), since these alternatives would require the most new stream crossings from among the action alternatives. The West Alternative would contribute the least to this cumulative impact since it would have the fewest new stream crossings (about 219). The East Alternative (about 277) would have similar but fewer new stream crossings than the Central and Crossover alternatives. While these contributions would be small in comparison to other historic, on-going, and future activities affecting water resources such as timber harvests and agricultural uses, the proposed project would

nonetheless contribute incrementally, though in a relatively minor way, to cumulative impacts to water resources.

26.3.12 Wetlands

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Cumulative impacts on wetlands have primarily resulted from past and present land development and land management practices including agricultural and timber harvest, urbanization, road construction and maintenance, and utility transmission. These impacts have been occurring since the area was settled and have increased over time in area and rate of development as populations increased and demand for resources such as crops and timber increased. It is likely that hundreds, if not thousands, of acres of wetlands have been cumulatively affected, through a combination of direct fill of these areas to make them more suitable for developed uses, activities within these areas that have reduced their functions and values, and unintentional and intentional releases of contaminants and pollutants to and through these areas. These impacts have also cumulatively affected the ability of regional wetlands to provide habitat, water retention and discharge, stream baseflow, flood and erosion control, and water quality improvement.

Wetlands continue to be impacted by development and land management practices (e.g., residential, commercial, and road development, timber harvest) that affect wetland loss or degrade functions and values, including filling wetland areas. Future projects, such as land development, agriculture, timber harvest, and additional transmission, pipeline, or other linear development, also could affect wetlands, depending on the presence or absence of wetlands in the areas in which these projects would take place. However, these impacts would be less than from similar actions that have historically occurred because of current wetland-related laws and regulations that require avoidance, minimization, and compensation (in that order of preference) for impacts to wetland resources. This “no net loss” approach serves to greatly reduce the overall cumulative impact on wetlands from any proposed development.

The proposed project would contribute to cumulative wetland impacts both by filling wetland areas for transmission line towers and access roads, and by construction activities and vegetation clearing of these areas for the transmission line right-of-way. The contribution to these cumulative impacts may be greatest from the West Alternative, since this alternative would potentially impact the greatest acreage of wetlands (about 154 acres, which includes clearing and fill) from among the action alternatives (see Chapter 16, Wetlands), but potentially could impact the lowest quality wetlands in terms of functions and values. Functional value of wetlands cannot be determined until wetland delineations are completed in the field. This acreage includes about 38 acres of direct wetland fill, which would be the greatest amount of such fill from among the action alternatives. The Central and East alternatives may have the least contribution to this cumulative impact since they each would potentially impact the fewest acreage of wetlands (about 105 acres for Central and 106 acres for East), and also would have the least amount of direct wetland fill (about 20 acres for Central and 22 acres for East). At the same time, the wetlands along these alternatives could be much higher in quality with higher functions and values. The Crossover Alternative, with about 114 acres of potential impacts to wetlands (of that, 26 acres of direct wetland fill), would be in between. Wetland delineations in the field would help determine wetland extent, values, and function.

Although a mitigation plan would be developed to compensate for project impacts to wetlands and efforts would be made to ensure the success of this mitigation, the long-term full effectiveness of this mitigation is uncertain, and all action alternatives thus would contribute to the cumulative reduction in the amount of wetlands in the project area. Overall, due to their general avoidance and minimization of impacts on wetlands, the Central and East alternatives would contribute incrementally, though in a relatively minor way, to potential cumulative wetland impacts in the project area. Because of the greater acreage of wetlands potentially affected by the West and Crossover alternatives, these alternatives would have a relatively high level of contribution to cumulative wetland impacts in the project area. At the same time, wetlands along the East and Central alternatives may provide higher function and values than wetlands along the West and Crossover alternatives.

26.3.13 Vegetation

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Past and present actions have resulted in extensive cumulative changes to native plant communities. From the mid 1800s to the present, timber harvests and population growth have converted large tracts of native plant communities, such as mature forests, prairies, and wetlands (see Section 26.3.12, Wetlands), to managed forests, agriculture, and/or urban/suburban areas. The ongoing loss of forests (particularly mature forest, forested riparian areas, and forested wetlands), herbaceous wetlands, prairies, and a number of specific special-status plant habitats are of significant concern in western Washington. Ongoing development and timber production activities are expected to continue and could cause continuing cumulative loss and degradation of forest and other native plant habitats.

The proposed project would also affect native plant habitats, particularly the Central, East, and Crossover alternatives, where new rights-of-way for the transmission line and access roads would be established and cleared. Specific to forest habitat—including forest, mature forest, and production forest, the East Alternative, followed closely by the Central Alternative, would have the greatest contribution to the cumulative loss of forest habitat because of vegetation clearing (see Chapter 17, Vegetation). Because it largely follows existing transmission corridors and would be located generally in more urbanized areas, the West Alternative would contribute the least to this cumulative impact. The contribution of the Crossover Alternative to this cumulative impact would be in between. Although the East and Central alternatives would have the greatest contribution to the cumulative loss of forest habitat, the loss is more production forest, which is of lower quality than forest and mature forest. The proposed project would contribute incrementally to potential cumulative impacts on forests and other native plant habitats.

Ongoing and future development and timber production activities also likely could create continuing cumulative impacts on special-status plant habitats. Of the action alternatives, however, only the West Alternative would permanently affect more than 0.5 acre of documented special-status plant habitats, about 12–46 acres of the Lacamas Prairie Natural Area—including a portion of the last documented wet prairie in Washington and WNHP Oregon white oak woodland priority ecosystem—lost to towers and access roads (see Chapter 17).

Only the West Alternative would potentially affect a federally listed species—Bradshaw’s lomatium—by removing from 0.08–4 acres of a documented occurrence and buffer area (depending on whether an option is chosen). To the extent that the project would potentially affect federally listed plant species, and impacts to them are determined to be unavoidable, BPA would take measures to ensure compliance with ESA requirements.

Other special-status plant species would be avoided to the extent possible, but unavoidable impacts may occur. As a result, the proposed project may add cumulatively to adverse impacts on special-status plant species resulting from other past, present, or reasonably foreseeable actions.

Past and present activities, such as development, agriculture, and road construction have introduced and spread noxious weeds into native plant habitats. These weeds would continue to spread as a result of ongoing and reasonably foreseeable future actions, and construction of the project would contribute to this cumulative impact, particularly in the Central, East, and Crossover alternatives where new right-of-way for the transmission line and access roads would create fresh avenues for weed dispersal into native habitats. Operation and maintenance activities would also contribute to this cumulative impact (see Chapter 17). The potential contribution to the spread of weeds on the state noxious weed list would be minimized by project-related mitigation measures such as spraying, reseeding, and revegetation. These measures would not address weeds not included on the state noxious lists unless they happen to be within listed weed populations being treated. With mitigation measures, the project would only contribute minor cumulative impacts from the spread of non-native weeds.

26.3.14 Wildlife

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Past and present actions have caused the cumulative loss and degradation of wildlife habitat, including special-status habitats—primarily WDFW priority habitats—that support a wide diversity of species. Clearing and converting land for agricultural use, urban development, utility infrastructure, roads, and other uses by past and present actions have caused the cumulative loss of wildlife habitat. These uses have also led to cumulatively increased wildlife disturbance from human activity, increased habitat fragmentation, increased wildlife mortality from roads, and the spread of non-native weeds, such as reed canarygrass, that reduce habitat diversity. In addition, timber harvest activities have converted large tracts of old-growth/mature forest habitat to managed forests, which has also led to increased disturbance from human activity, habitat fragmentation, and reduced habitat diversity. This habitat loss and degradation have caused the cumulative displacement of wildlife species, including special-status wildlife species such as northern spotted owl and western pond turtle. Wildlife species also have been cumulatively affected by hunting and trapping activities, and by incidental harm and killing from other human activities in the area.

Reasonably foreseeable future actions involving development in previously undeveloped areas would incrementally add to cumulative wildlife impacts, both through reduction of potential habitat, and disturbance and mortality of wildlife species in and around the sites of these actions. Timber production areas would continue to be managed under a cyclical harvest schedule, with similar impacts to wildlife habitat and species as described above.

The proposed project would contribute to cumulative wildlife impacts through the permanent loss of wildlife habitat where project facilities such as transmission towers, access roads, and substations would be located; loss, alteration, or degradation of wildlife habitat from vegetation clearing within the transmission line right-of-way; disturbance and mortality of wildlife species during project construction; and bird mortality due to collisions with the proposed transmission line (see Chapter 18, Wildlife). All action alternatives would contribute incrementally to the impacts that past, present, and reasonably foreseeable future timber production, urbanization, utility infrastructure, roads, and agricultural and other uses have had on wildlife species and habitat. The Central and East alternatives would contribute more to cumulative impacts on wildlife habitat in general since they would affect a greater total amount of habitat. However, most of this habitat is production forest, the loss of which is considered a lower impact since the habitat is common in the area. It also holds less value for wildlife than native forest or old-growth/mature forest since it already has or will be disturbed and degraded by logging.

The West Alternative, followed by the Crossover Alternative, would contribute more to cumulative impacts on bird species and WDFW priority habitats. Along the West Alternative, the combination of parallel transmission lines set at different heights and the occurrence along the right-of-way of three WDFW waterfowl concentration priority areas, one WDFW wood duck priority area, one WDFW Woodland Cavity Nesting Duck Priority Area, and about twice as much wetland habitat as the other action alternatives, would increase the risk of bird mortality through collisions with transmission lines. It would also contribute more to cumulative impacts on WDFW priority habitats, including riparian areas, wetlands, old-growth/mature forest, westside prairie, and Oregon white oak woodlands, since it would remove substantially more combined acres of these important wildlife habitats than the other action alternatives, followed closely by the Crossover Alternative (see Section 26.3.12, Wetlands). However, the East Alternative would remove substantially more documented WDFW snag and log priority habitat (i.e., WDFW snag-rich areas) than the other action alternatives, and the Crossover Alternative would remove almost twice as much old-growth/mature forest.

Only three federally listed species—northern spotted owl, marbled murrelet, and Columbian white-tailed deer—are documented in the study area (see Chapter 18, Wildlife), and of these, only the northern spotted owl is documented within 1 mile of any of the action alternatives. No known northern spotted owl nests would be affected by the action alternatives, so the proposed project would not contribute to cumulative reductions of any such nests. The new transmission line right-of-way and proposed access roads outside of this right-of-way under all action alternatives would, however, pass through potentially suitable northern spotted owl habitat, and the Central, East, and Crossover alternatives would pass through documented northern spotted owl circles. Construction activities could disturb any spotted owls present in these areas during construction, and tree clearing and the presence of the proposed project would add to the cumulative removal of potential spotted owl habitat in the area. The contribution to these cumulative impacts would be greatest from the East Alternative, which would pass through about 25 miles of potential habitat and remove about 220 acres of habitat from within four documented northern spotted owl circles. This would be followed by the Crossover Alternative (about 19 miles of potential habitat and 70 acres from one circle), the Central Alternative (about 13 miles of potential habitat and 4 acres from one circle), and finally the West Alternative (about 4.5 miles of potential habitat and only coming within about 0.4 mile of one circle).

Similar to the northern spotted owl, no known marbled murrelet nests would be affected by any of the action alternatives for the proposed project, so the proposed project would not

contribute to cumulative reductions of any such nests. The new transmission line right-of-way and access roads outside this right-of-way under all action alternatives would pass through the eastern extent of the Western Washington Coast Range Conservation Zone, or Conservation Zone 2, for marbled murrelet (marbled murrelet conservation zone). However, the proposed project is east of the typical range of the marbled murrelet, and only small pockets of old-growth/mature forest occur in this portion of the project area. Therefore, the proposed project would contribute in a relatively minor way to the cumulative reduction of habitat within a marbled murrelet conservation zone, with the West and Crossover alternatives having the greatest reductions in suitable old-growth/mature forest habitat within the conservation zone. As with vegetation, to the extent that the project would potentially affect federally listed wildlife species and impacts to them are determined to be unavoidable, BPA would take measures to ensure compliance with ESA requirements.

Other special-status species or species groups, including federal species of concern, state-listed species, WDFW priority species, and WDFW priority areas, would be avoided to the extent possible, but unavoidable impacts may occur. As a result, the proposed project may add cumulatively to adverse impacts caused by other past, present, or reasonably foreseeable actions on special-status species or species groups.

26.3.15 Fish

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Past and present actions that have cumulatively affected fish include agricultural and timber harvest practices and other human development, especially in floodplains. These actions have caused the loss of streamside riparian cover and function, the loss of large woody debris sources, and the addition of sediment into streams. In addition, development of the hydroelectric system on the Lewis and Columbia rivers has cumulatively affected both downstream and upstream fish survival, as has industrial and other development along these rivers that have adversely affect fish habitat. Fish harvest in the Columbia River, its tributaries and the ocean, has further reduced overall populations of fish species. In recent years, however, the cumulative adverse effect on fish from these factors has appeared to lessen with better passage conditions, directed harvest management, and fish habitat restoration and improvements.

Reasonably foreseeable future actions that could cumulative impact fish include actions that would remove shade vegetation in riparian areas along rivers or streams and actions that degrade water quality in project area rivers or streams from soil erosion or other discharges. These future actions include forest harvests, residential and commercial development (especially in floodplains, conversion of forest land to open space or agriculture, and increasing widths of existing or creation of new rights-of way for roads and transmission lines). Construction by PacifiCorp of fish passage facilities and other improvements on the Lewis River, on the other hand, would serve to cumulatively improve conditions for fish in project area waterways (see Table 26-2). In addition, regulations and management practices are being implemented to mitigate or restore natural stream functions. In particular, riparian conservation regulations and guidelines maintained in habitat conservation planning and in shoreline and forest harvest planning would likely result in a greater degree of riparian function.

These regulations and guidelines are intended to protect forested riparian areas, and actively manage them to restore their functions.

The project, regardless of the action alternative, would remove forested vegetation in riparian areas along the transmission line right-of-way and access roads, and these areas would be managed by restricting the height of future vegetation growth. Forested riparian areas along streams provide both shade for cooling and the potential for large woody debris recruitment, which are needed for high quality fish habitat which benefit fish.

The project would contribute to a cumulative reduction in riparian area function and add to the cumulative amount of riparian forest removed in the project area, to an extent largely dependent on the number of forested fishbearing rivers and streams crossed by a particular alternative (see Chapter 19, Fish). Accordingly, the Central Alternative would have the greatest contribution to this cumulative impact since it would cross 68 forested fishbearing rivers and streams and would permanently remove more highly functioning shade vegetation and large wood debris potential at these locations. The Crossover and East alternatives would follow with similar, but slightly less, levels of contribution (55 and 52, respectively) to this cumulative impact since it would cross fewer fishbearing rivers and streams. The West Alternative would have the least contribution to cumulative impacts (47) on fish.

Construction activities would also place towers and roads in floodplains and expose soil that could cause erosion and sediment delivery into rivers and streams. These effects are minor, causing a small estimated average percent reduction in the production of affected fish populations (less than 0.2 percent) (see Chapter 19, Fish). The project would have negligible incremental contributions to cumulative impacts on fish, including listed species.

26.3.16 Air Quality

The spatial boundary for the following analysis consists of the general vicinity of the proposed transmission line routes and substations, and more broadly the three counties that would be crossed by these routes (Cowlitz, Clark, and Multnomah counties).

Many past actions have contributed to cumulative air quality impacts through emissions of air pollutants as part of ongoing operations and/or through fugitive emissions (e.g., vehicular-related emissions and construction-related dust generation). However, only those actions still occurring are contributors to current cumulative air quality impacts in the area; those past actions that have ceased do not currently contribute to these impacts. On-going actions include agricultural uses, timber harvests, the burning of wood and fossil fuels in residential and commercial/industrial uses, road construction and maintenance, other transportation infrastructure improvements, and vehicle use.

Many of the reasonably foreseeable future actions would be expected to contribute to these cumulative air quality impacts (see Table 26-2). Future projects involving construction activities on vacant land likely would generate PM₁₀ emissions in the form of windblown dust. Proposed power generation and industrial facilities would be new sources of air pollutants, both from facility operations and from ancillary activities such as vehicle use and materials storage. The actual contribution from these future actions would depend on the level and amount of emission control methods and technologies employed.

The action alternatives would contribute to cumulative air quality in generally the same manner and amounts, so cumulative impacts on air quality would be similar among all action alternatives. Air emissions from the action alternatives would occur primarily during construction, from airborne dust generated by construction activities and from emissions from construction vehicles and heavy equipment. These emissions would temporarily and locally contribute to cumulative impacts on air quality in the immediate vicinity of construction activities, but would not be expected to have a noticeable effect on overall regional cumulative air quality. In addition, after construction, ongoing operation of the proposed project would not result in a measurable contribution to cumulative air quality impacts in the region. Ongoing emissions from corona discharge from the proposed transmission line may generate small quantities of ozone and nitrogen oxide emissions near the line, and periodic vehicle trips for inspection and repair would emit small amounts of carbon monoxide, sulfur oxides, and other pollutants, but these emission levels would be indistinguishable from background concentrations and would not contribute to cumulative impacts.

26.3.17 Greenhouse Gases

Greenhouse gas (GHG) concentrations in the atmosphere and corresponding climate change occurring over the past 50 years have been significantly affected by anthropogenic contributions. GHG emissions have largely originated from the burning of fossil fuels, volcanic eruptions and other natural activity, and the clearing of forests around the world from many and varied sources during this time, and for a significant period before that (Karl et al. 2009). Therefore, unlike the cumulative impacts analyses for other resources, the global nature of GHG concentrations makes it impossible to define a spatial boundary short of global or to catalogue past, present, and reasonably foreseeable future actions for this resource.

Any action where fossil fuels have been, or are being burned contributes to GHG concentrations. Examples of such actions include home heating, automobile and other vehicle use, electricity generation, and processing and manufacturing of goods, among others. In the project vicinity, past development and land management activities have affected air quality and contributed to greenhouse gases. Population growth, increases in commercial/industrial development, energy facilities, and expanded transportation infrastructure have all increased emissions.

Actions that cause soil disturbance, vegetation loss or burn biomass can also increase concentrations. Vegetation can affect concentrations in two ways. First, if vegetation is removed prior to maturation, the carbon storing potential is lost and CO₂ can no longer be sequestered in that vegetation. Second, if that biomass is burned, it will release all the carbon it has sequestered back into the atmosphere as CO₂. These actions have occurred in the past, are likely still occurring, and will continue to occur in the future.

In analyzing the project's cumulative impact, global, national, and regional GHG emissions were considered. In 2006, the United States Energy Information Administration (EIA) estimated global GHG emissions at 29,017,000,000 metric tons of CO₂ equivalent (EIA 2009a). In 2008, total U.S. GHG emissions were estimated at 6,956,800,000 metric tons of CO₂ equivalent. Overall, total U.S. emissions have risen by about 14 percent from 1990 to 2008. In 2007, the four states within BPA's service territory emitted an estimated 180,060,000 metric tons of CO₂ (see Table 26-3). Oregon and Washington, combined, emitted an estimated 127,080,000 metric tons of CO₂ (see Table 26-3).

Table 26-3 Estimated Annual CO₂ Emissions for Each State in BPA's Service Territory

State	CO2 Emissions (metric tons)
Idaho	16,280,000
Montana	37,700,000
Oregon	43,520,000
Washington	82,560,000
Total	180,060,000
Source: EPA 2007	

One evaluation has concluded that, as a result of increased GHG concentrations, the earth's temperature has increased by about 1.5 degrees F over the last century (Karl et al. 2009). Models predict that the warming of the planet will continue and the planet could be as much as 11.5 degrees F warmer by 2100 with the current level of GHG emissions. The effects of increased temperatures include sea level rise due to shrinking ice caps and glaciers, changes in biodiversity as species try to move into more optimal temperature ranges, lengthening of growing seasons, and thawing of permafrost (Karl et al. 2009).

In the Northwest, statistical data indicates that the annual average temperature also has risen about 1.5 degrees F over the past century, with some areas experiencing increases up to 4 degrees F. Many experts believe that this temperature rise is a major contributing factor to the 25 percent reduction in average snowpack in the Northwest over the past 40 to 70 years. A continued decline in snowpack in the mountains will decrease the amount of water available during the warm season. A 25- to 30-day shift in the timing of runoff has been observed in some places, and the trend is expected to continue as the region's average temperature is projected to rise another 3 to 10 degrees F in the 21st century (Karl et al. 2009).

Any addition to GHG emissions could contribute to long-term effects on climate change. However, when compared to the regional, national, and global rates, the GHG emissions estimated for the proposed project are negligible (see Chapter 22, Greenhouse Gases).

26.3.18 Climate

No impacts on climate from the transmission line have been identified. As a result, there are no cumulative impacts on climate from the project. Climate would have low impacts on the transmission line project. Impacts are dependent on terrain and the varying climate at different elevations. These impacts are temporary and not cumulative in nature, and there would be no cumulative impacts from climate for the project.